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Report on the individual review of the annual submission of Estonia submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and *not to the* year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Estonia, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 22 to 27 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland) and Mr. Riccardo de Lauretis (Italy); energy – Mr. Kennedy Amankwa (Ghana), Ms. Emilia Hanley (Ireland), Mr. Michael Smith (New Zealand) and Mr. Hongwei Yang (China); industrial processes and solvent and other product use – Mr. Samir Tantawi (Egypt) and Mr. David Thistlethwaite (United Kingdom); agriculture – Ms. Savitri Garivait (Thailand) and Mr. Steen Gyldenkærne (Denmark); land use, land-use change and forestry (LULUCF) – Ms. Andrea Brandon (New Zealand), Mr. Nguyen Dinh Hung (Viet Nam) and Mr. Xiaoquan Zhang (China); and waste – Ms. Juliana Bempah (Ghana) and Ms. Katja Pazdernik (Austria). Ms. Bempah and Mr. Eggleston were the lead reviewers. The review was coordinated by Mr. Vlad Trusca (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Estonia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team (ERT)'s assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Estonia was carbon dioxide (CO_2), accounting for 89.0 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (5.3 per cent) and methane (CH_4) (4.9 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 87.9 per cent of total GHG emissions, followed by the agriculture sector (6.9 per cent), the industrial processes sector (3.5 per cent), the waste sector (1.6 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 19,189.47 Gg CO_2 eq and decreased by 52.8 per cent between the base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable but could be improved, including by providing a more accurate description of the fluctuation of emissions occurring after 1993, especially for the energy and waste

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of carbon dioxide equivalent excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

sectors. The ERT therefore encourages Estonia to improve the description of emission trends in the NIR of its next annual submission.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		CO_2	36 700.83	36 700.83	17 997.83	17 365.55	14 157.98	17 803.32	18 427.19	17 079.28	–53.5
		CH_4	1 680.98	1 680.98	984.44	1 013.23	947.25	967.79	924.43	931.66	–44.6
		N_2O	2 244.10	2 244.10	1 058.18	1 035.35	944.60	967.47	971.85	1 009.21	–55.0
		HFCs	25.37	NA, NE, NO	25.37	131.48	138.31	153.04	159.72	167.36	559.8
		PFCs	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.04	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA
		SF_6	3.22	NA, NE, NO	3.22	1.35	1.44	1.81	1.85	1.96	–39.0
KP-LULUCF	Article 3.3[b]	CO_2				692.11	625.27	424.90	346.78	306.58	
		CH_4				0.01	0.01	0.02	0.02	0.003	
		N_2O				0.002	0.002	0.003	0.003	0.001	
	Article 3.4[c]	CO_2	NA			NA	NA	NA	NA	NA	NA
		CH_4	NA			NA	NA	NA	NA	NA	NA
		N_2O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

		Gg CO_2 eq								*Change (%)*
	Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year 2012*
Annex A sources	Energy	36 019.14	36 019.14	17 610.89	16 752.10	14 128.21	17 768.24	18 253.84	16 873.83	–53.2
	Industrial processes	1 076.82	1 048.23	675.54	1 051.30	451.20	494.34	614.20	662.58	–38.5
	Solvent and other product use	26.48	26.48	26.16	21.96	18.49	17.39	18.86	18.72	–29.3
	Agriculture	3 177.03	3 177.03	1 495.38	1 336.21	1 236.22	1 261.85	1 273.85	1 326.17	–58.3
	Waste	355.03	355.03	261.07	385.42	355.46	351.61	324.30	308.17	–13.2
	LULUCF	NA	–8 820.17	–10 515.17	–7 149.95	–6 039.84	–4 579.04	–2 883.35	–1 951.18	NA
	Total (with LULUCF)	**NA**	**31 805.74**	**9 553.86**	**12 397.05**	**10 149.74**	**15 314.38**	**17 601.69**	**17 238.29**	**NA**
	Total (without LULUCF)	**40 654.50**	**40 625.91**	**20 069.04**	**19 547.00**	**16 189.58**	**19 893.42**	**20 485.04**	**19 189.47**	**–52.8**
	Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c] Afforestation and reforestation				–60.49	–81.29	–102.87	–119.69	–130.51	
	Article 3.3[c] Deforestation				752.61	706.58	527.79	466.49	437.10	
	Total (3.3)				**692.12**	**625.29**	**424.92**	**346.80**	**306.59**	
	Article 3.4[d] Forest management				NA	NA	NA	NA	NA	
	Article 3.4[d] Cropland management	NA			NA	NA	NA	NA	NA	NA
	Article 3.4[d] Grazing land management	NA			NA	NA	NA	NA	NA	NA
	Article 3.4[d] Revegetation	NA			NA	NA	NA	NA	NA	NA
	Total (3.4)	**NA**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Estonia also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Estonia submitted revised emission estimates on 10 October 2014 in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Estonia on 10 October 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Estonia. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: CH_4 emissions from distribution of oil products; potential HFC and SF_6 emissions; and CH_4 emissions from enteric fermentation for poultry
		Please see paragraphs 34, 43 and 56 below for category-specific findings
		The ERT encourages Estonia to estimate and report emissions from all non-mandatory categories
Land use, land-use change	Complete	Mandatory: none

Issue	*Expert review team assessment*	*General findings and recommendations*
and forestry[a]		Non-mandatory: non-CO_2 emissions from drainage of forest soils; net carbon stock changes in soils in grassland converted to wetlands; all pools and all gases in settlements remaining settlements; non-CO_2 emissions in land converted to settlements; and N_2O emissions in harvested wood products and other Please see paragraph 66 below for category-specific findings The ERT encourages Estonia to estimate and report emissions from all non-mandatory categories
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	
Time-series consistency	Sufficiently consistent	Please see paragraph 35 below for category-specific findings
The ERT's findings on QA/QC procedures	Sufficient	Estonia has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan Please see paragraphs 30, 42, 69, 75, 76 and 89 below for category-specific recommendations
The ERT's findings on transparency	Sufficiently transparent	Please see paragraphs 31, 43, 68, 72, 79 and 82 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR described the national system for the preparation of the inventory. There were several changes to the national system for the 2014 annual submission, as identified by Estonia in its NIR. The Ministry of the Environment (MoE) has overall responsibility for the national inventory, including the coordination of inventory preparation, the conclusion of formal agreements with inventory compilers, the approval of the submission

and the process of reporting to the secretariat, as well as the coordination of the response to the review process. In collaboration with MoE, the Estonian Environmental Research Centre (EERC) and the Estonian Environment Agency (EtEA) are currently involved in the preparation of the inventory (see para. 13 below). EERC, as the inventory compiler, is responsible for the coordination of the inventory process, the calculation of emission estimates, the compilation of the NIR, the implementation of the quality assurance/quality control (QA/QC) plan and the overall archiving system. EERC is contracted on a three-yearly basis (2014, 2015 and 2016) by MoE for the emission inventory of the energy, industrial processes, solvent and other product use, agriculture and waste sectors. The Forest Monitoring Department of EtEA is responsible for the LULUCF and KP-LULUCF estimates in accordance with a mandate included in its legal statute. Moreover, MoE has a bilateral agreement with Statistics Estonia (SE) to provide most of the activity data (AD) used in the inventory preparation process.

13. The 2013 inventory submission was produced through collaboration between MoE, the Estonian Environment Information Centre (EEIC), Tallinn University of Technology and EERC, although Tallinn University of Technology was not involved in preparation of the 2014 inventory submission. EtEA was formed in 2013 as a result of the merger of EEIC and the Estonian Meteorological and Hydrological Institute and it is the legal successor to its predecessors. Therefore, the 2014 annual submission was produced by collaboration between MoE, EtEA and EERC.

14. The NIR contains an improvement plan for future annual submissions which includes the sectoral improvement needs identified by the Estonian inventory experts. The main pending issues not yet addressed by Estonia but planned for the near future are:

(a) Reviewing the constant value of the emission factor (EF) used for the period 1990–2009 to estimate fugitive CH_4 emissions from natural gas distribution in the energy sector (see para. 35 below);

(b) Developing a country-specific CO_2 EF time series for glass production in the industrial processes sector;

(c) Developing country-specific values for the fraction of total above-ground crop biomass that is removed from the field as crop ($Frac_R$) and the fraction of crop residue burned ($Frac_{BURN}$) in the agriculture sector;

(d) Developing country-specific forest litter EFs and a mineral soil carbon stock change factor, and conducting fieldwork to estimate the carbon stock changes in cropland and grassland mineral and organic soils in the LULUCF sector.

Inventory preparation

15. Table 4 contains the ERT's assessment of Estonia's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Estonia

Issue	*ERT assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Tier 1	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Please see paragraph 16 below
Quantitative uncertainty (including LULUCF)	Level = 9.5% Trend = 4.6%	
Quantitative uncertainty (excluding LULUCF)	Level = 5.7% Trend = 2.0%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

16. In response to recommendations made in the 2012 review report, Estonia has corrected the uncertainty of the CO_2 EF for solid fuels for the category public electricity

and heat production in the 2014 annual submission. The previous uncertainty estimate in the 2013 annual submission was overestimated and based on an outdated study. The revision of the uncertainty has had a significant impact on Estonia's combined inventory uncertainty as a percentage of total GHG emissions: in the 2014 annual submission it was reported as 5.7 per cent for 2012, without LULUCF, while the uncertainty reported in the 2013 annual submission was 24.9 per cent for 2011, without LULUCF. Estonia has reported a detailed explanation of this revision in the relevant section of the NIR.

Inventory management

17. There were no major changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by Estonia in its NIR. To prepare the estimates for the agriculture sector in the 2014 annual submission, EERC did not subcontract Tallinn University of Technology; however, this did not affect the inventory management process or the archive managed by EERC. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Estonia submitted in 2013,[3] remains relevant.

5. Follow-up to previous reviews

18. The ERT acknowledges that most of the recommendations made in the 2013 review report have been addressed by Estonia in its 2014 annual submission, thereby enhancing the transparency of the inventory across all sectors. Estonia has addressed the following recommendations:

(a) Revising the AD for the energy sector: oil shale consumption for 2011; liquid fuel consumption in international bunkers (aviation) for 1993, 1996, 2007, 2010 and 2011; feedstocks and non-energy use of fuels: lubricants for 2011; oil shale for all years of the time series; and bitumen for the years 2003–2011;

(b) Changing the notation key to "NO" (not occurring) in CRF table 1.B.2 for oil transport and oil refining/storage, as the transport, refining and storage of crude oil do not occur in Estonia;

(c) Developing country-specific carbon EFs for liquid (e.g. diesel oil, liquefied petroleum gas (LPG)) and solid fuels (coal and coke) in combustion sectors (where the above-mentioned fuels are applicable) for the full time series for the following categories: public electricity and heat production, manufacturing industries and construction, railway transport, domestic navigation, other combustion and other mobile;

(d) Correcting the CO_2 EF for aviation (civil and international bunkers) for landing and take-off (LTO) to the Intergovernmental Panel on Climate Change (IPCC) default EF (constant) and correcting the CO_2 EF for semi-coke gas for 2011 in the category public electricity and heat production;

(e) Providing more detailed information on the methodology used to estimate the carbon stock changes in any land converted to other land;

(f) Improving transparency by providing additional information in the NIR (e.g. on nitrogen (N) excretion from cattle, and the forestry definition and assumptions);

(g) Improving the uncertainty estimates by correcting the uncertainty estimates for the CO_2 EF for solid fuels under the category public electricity and heat production.

[3] FCCC/ARR/2013/EST, paragraph 14.

19. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

20. The energy sector is the main sector in the GHG inventory of Estonia. In 2012, emissions from the energy sector amounted to 16,873.83 Gg CO_2 eq, or 87.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 53.2 per cent. The key driver for the fall in emissions is the transition from a centrally planned economy to a market economy after 1991, when Estonia regained its independence. Structural changes in the economy were followed by a major increase in fuel prices causing a decrease in the consumption of fuels in transport and all other categories accompanied by closures of many power stations and factories. Within the energy sector in 2012, 77.6 per cent of the emissions were from energy industries, followed by 13.5 per cent from transport, 4.6 per cent from manufacturing industries and construction, and 3.7 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 0.5 per cent and the remaining 0.1 per cent was from other.

21. Estonia has made recalculations between the 2013 and 2014 annual submissions for this sector. The recalculations were made in response to recommendations made in the previous annual review report including changes in AD, EFs and notation keys. The most significant recalculations made by Estonia between the 2013 and 2014 annual submissions were made because of revisions of EFs for solid and liquid fuels in all relevant fuel combustion categories and resulted in recalculations for the entire time series. The most significant impact of the recalculations in the energy sector was noted for the emissions for 2011, which decreased by 407.79 Gg CO_2 eq (2.2 per cent between submissions) as a result of the revision of oil shale consumption and the implementation of country-specific CO_2 EFs for diesel oil, light fuel oil, residual fuel oil, LPG, coal and coke. The recalculations were adequately explained.

2. Reference and sectoral approaches

22. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 23 and 24 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross-references*
Difference between the reference approach and the sectoral approach	Energy consumption: –0.33 PJ, –0.16% CO_2 emissions: 1 065.19 Gg CO_2, 6.43%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	See para. 23 below
Are differences with international statistics adequately explained?	No	See para. 24 below

Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

23. Estonia described the differences between the reference approach and the sectoral approach in section 3.2.1 of and annex 4 to the NIR. The difference in the CO_2 emission estimates between the two approaches in the 2014 annual submission was 6.4 per cent for 2012. The explanations provided in the NIR state that differences are caused by the use of secondary fuels in final consumption (sectoral approach) for shale oil, semi-coke and oil shale gas – all of which are made from oil shale; another major reason for the differences in fuel consumption between the sectoral and reference approaches is the statistical difference in the Estonian national energy balance. In response to a question raised by the ERT during the review, Estonia stated that historically only the national energy balance provided by SE was used when calculating the emissions in the energy sector. Owing to the fact that these data were different from those presented in the international energy statistics, Estonia started using the joint questionnaire data compiled by SE and sent to the International Energy Agency (IEA) and Eurostat under the European Union Emissions Trading System (EU ETS). Estonia is aware of the difference between the sectoral and reference approaches and plans to decrease this difference in the next annual submission, as also explained to the ERT during the review. The ERT recommends that Estonia provide clear and comprehensive explanations in the next NIR with additional information on the drivers behind the difference in the CO_2 emissions in the sectoral and reference approaches between two annual submissions (especially if a significant difference persists in future annual submissions).

24. In the 2013 annual review report, the ERT recommended that Estonia improve the consistency between the data reported to IEA (EU ETS data) and the data gathered by SE for the compilation of the inventory. During the review, Estonia informed the ERT that, in the past, only the national energy balance provided by SE was used to estimate emissions, assuming that the data were similar to the international energy statistics. Following the recommendations made in previous review reports, Estonia started to use the data in the joint questionnaire sent to IEA and Eurostat for the reporting under the EU ETS, and plans to further harmonize the data with the national energy balance. The ERT reiterates the recommendation made in the previous review report that Estonia improve the consistency between the data reported to IEA and the data gathered by SE. This harmonization will also improve the comparison of the reference approach and the sectoral approach, as explained in paragraph 23 above.

International bunker fuels

25. No problems were identified by the ERT.

Feedstocks and non-energy use of fuels

26. No problems were identified by the ERT.

3. Key categories

Stationary combustion: solid fuels – CO_2

27. The main domestic fuel in Estonia is oil shale. Oil shale is both combusted directly for the production of electricity and heat and used as feedstock for the production of shale oil. Recommendations made in previous review reports required Estonia to prepare carbon balances for shale oil production. Regarding the carbon balance, the normal procedure is to calculate the carbon inputs (oil shale) and outputs (shale oil, semi-coke, etc.) and then to compare the two sets of figures. In the carbon balance prepared by Estonia in its 2014 annual submission, the carbon is calculated for most fuel streams, but for the last output fuel (which depends on two different oil shale thermal processing technology types as described in annex 2 to the NIR) the carbon content is calculated as the input minus all other output carbon. This issue results in a highly variable CO_2 implied emission factor (IEF) for the last fuel stream for all three plants producing shale oil. It also implies that the output will always precisely match the input, which may not impact total emissions but appears to be inaccurate and not a reflection of the real measurements of carbon in waste fuel streams from oil shale thermal processing. In the previous review report, the ERT also recommended that Estonia collect data on the carbon content of all fuel streams and prepare the carbon balance to verify that no fugitive losses occur during the process.

28. However, in response to questions raised by the ERT during the review, Estonia explained that the producing companies had been contacted but the Party had not been able to obtain the carbon content of the last output stream; therefore, the calculation practice indicated in paragraph 27 above is still in place. Estonia is currently seeking opportunities to measure the emissions from solid heat carrier installations processing shale oil. Therefore, the ERT strongly reiterates the recommendation made in the previous review report that Estonia collect data (plant-specific parameters or direct measurements) on the carbon content of the last fuel stream (semi-coke from gaseous heat carriers in gas generator technology and flue gases from solid heat carrier technology) and prepare a complete and accurate carbon balance, including a verification that no fugitive losses occur during the process that might not be captured by the current approach and ensuring that no emission estimates are missing. The ERT considered this issue during the 2014 annual review and did not identify a potential problem during the review week. However, the ERT strongly recommends that Estonia carefully consider the issues raised in this paragraph in the context of its 2015 annual submission.

29. Following the recommendations made in the 2013 annual review report, the CO_2 EFs for fuel combustion in energy industries and manufacturing industries and construction are now correctly referenced in the NIR as IPCC default values, apart from the three peat derivatives (milled peat, sod peat and peat briquettes). The CO_2 EFs for those peat fuels in table 3.12 of the 2014 NIR are referenced as "CS, FI (Finland) = D, IPCC 1996, Vol. 2, Table 1-2" but should be correctly referenced as IPCC default values: they are not country-specific because they are used as IPCC default values by another Party (Finland). Estonia informed the ERT during the review that these three remaining references will be corrected in future annual submissions. The ERT acknowledges the improvements made and encourages Estonia to correct the EF references for milled peat, sod peat and peat briquettes in its next annual submission.

30. With respect to the recommendation made in the previous review report regarding the EFs for CO_2 emissions from solid fuel combustion in energy industries, the ERT noted that significant differences exist between the CO_2 EFs presented in the NIR and the corresponding plant-specific EFs reported under the EU ETS for some fuels (with higher values used in the inventory). This issue has not been addressed and Estonia informed the ERT during the review that it is currently examining the possibility of using the EFs from the reporting under the EU ETS for shale oil production plants. The ERT noted that the differences should be clearly understood before the EFs from the EU ETS can be used. The ERT recommends that Estonia apply strict QC procedures to the EFs used from the EU ETS, ensuring the quality of the data, and provide sufficient information on these EFs in the NIR.

Road transportation: liquid fuels – CO_2

31. Following the recommendations made in previous review reports, Estonia has developed country-specific CO_2 EFs for each year of the time series for three fuels, gasoline, diesel oil and LPG, calculated using the weighted average of the EFs used in the countries where the fuels originated (NIR table 3.30). All the country-specific CO_2 EFs used for the period 1990–2012 are included in table 3.29 of the NIR. Following a request made by the ERT during the review, Estonia stated that the sources of the EFs used for the calculations of the three fuel types are the official inventory submissions of the respective countries of import. The ERT acknowledges the information provided in the NIR on the fuels by country of import and recommends that Estonia provide a similar table listing all EFs used to calculate the weighted average EF for Estonia, at least for the most recent reporting year and for all three fuels.

4. Non-key categories

Civil aviation: liquid fuels – CO_2

32. In the previous review report, the ERT noted that Estonia reported different CO_2 EFs for aviation gasoline for LTO cycles and cruise modes, and recommended that Estonia revise the LTO EFs to the same value (in kg/t) as that calculated for cruise mode. The ERT commends Estonia for correcting this error in the 2014 annual submission and recalculating the LTO CO_2 emissions (in accordance with the IPCC tier 2 methodology). During the review, the Party explained that there is a minor error regarding the CO_2 EF value for LTO aviation gasoline, which differs from the cruise EF in table 3.25 of the NIR, although the correct EF (the same as the cruise EF) was used for the calculation of LTO emissions. The ERT encourages Estonia to correct the CO_2 EF value for LTO aviation gasoline in table 3.25 of its next NIR and ensure that adequate QC procedures are implemented.

Road transportation: liquid fuels – CH_4 and N_2O

33. Following a recommendation made in the previous review report, Estonia included in its NIR new information on the reasons behind the inter-annual fluctuations in the CH_4 and N_2O country-specific EFs. During the review, Estonia provided the ERT with the list (for 2012) of the countries of origin for each imported fuel and their respective CO_2 EFs used as the basis for the calculations of the Party's weighted average CO_2 EFs for petrol, diesel and LPG, feeding into table 3.29 of the NIR. The ERT encourages Estonia to follow the CO_2 EF information example and include additional tables with the time series of CH_4 and N_2O EF values for each fuel in its next annual submission, and to further elaborate on the rationale behind the fluctuations in the time series.

Oil and natural gas: oil – CH_4

34. In the previous review report, the ERT noted that Estonia estimated CH_4 emissions from transport and storage of crude oil, which was an error as oil refining does not take place in the country. Estonia clarified that the AD used in the calculations related to refined oil products and not to crude oil. Estonia followed the recommendation and correctly applied the notation key "NO" in CRF table 1.B.2 for oil transport and oil refining/storage in the 2014 submission. The ERT commends Estonia for this improvement. However, the ERT also reiterates the recommendation from the previous review report that Estonia change the notation key for distribution of oil products, as this practice does occur in Estonia.

Oil and natural gas: natural gas – CH_4

35. As noted in the previous review report, Estonia uses an EF from Finland for all years of the time series for the calculation of emissions from natural gas distribution. The ERT noted that these fugitive emissions will depend on the type and state of the natural gas

distribution system and the use of an EF from Finland is unlikely to reflect Estonian conditions. During the review, the ERT sought further information from Estonia regarding the availability of national data from its natural gas distributor, considering the fact that plans to develop country-specific EFs for natural gas were mentioned in the NIR (section 3.3.2.6). In response, Estonia provided the ERT with information on the annual quantities of natural gas lost (between imports and sales) and the gas characterization parameters as received from the natural gas distribution company (Eesti Gaas) for the years 2009–2012 and informed the ERT that similar information is not available for the years 1990–2008. Estonia also informed the ERT that it plans to analyse the information for the years 2009–2013 and communicate again with the network operator with the aim of developing country-specific EFs for the period 1990–2008. The ERT appreciates the efforts made by Estonia to obtain information for the years 2009–2012 and encourages the Party to develop country-specific EFs for natural gas for the entire time series or use IPCC default values instead of the EFs from Finland.

C. Industrial processes and solvent and other product use

1. Sector overview

36. In 2012, emissions from the industrial processes sector amounted to 662.58 Gg CO_2 eq, or 3.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 18.72 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 38.5 per cent in the industrial processes sector, and decreased by 29.3 per cent in the solvent and other product use sector. The key drivers for the reported trends in the industrial processes sector are: the transition from a centrally planned economy to a market economy after 1991, which led to lower industrial production and a rapid decrease in emissions between 1991 and 1993, followed by a relatively stable period between 1994 and 2001. Emissions then declined sharply in 2002 owing to the reconstruction of the country's only ammonia production plant, reducing ammonia production during 2002 and 2003. Emissions subsequently rose from 2003 to 2004 as production at the ammonia plant increased, followed by a notable increase in emissions in 2007 as the country's cement operator renovated a kiln and increased production. Emissions then sharply declined in 2009 owing to the global economic recession during 2008 and 2009, which led to a reduction in industrial production owing to the lower demand from domestic and international markets. Industrial emissions rose during both 2011 and 2012 as a result of increases in cement production and the reopening of the ammonia plant in 2012, which had been closed since 2009. Within the industrial processes sector, 70.7 per cent of the emissions were from mineral products, followed by 25.6 per cent from consumption of halocarbons and SF_6. The remaining 3.8 per cent were from the chemical industry.

37. Estonia has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector following changes in AD, where companies have provided either more detailed or additional AD, and in order to correct identified errors.

38. The most significant recalculations made by Estonia between the 2013 and 2014 annual submissions were in the following subcategories:

(a) Commercial refrigeration: the AD for 2010 and 2011 were revised after the provision of more accurate data from companies installing and servicing refrigeration units;

(b) Fire extinguishers: the AD for the years 2005–2011 were revised because of the availability of new data from companies installing and servicing fire protection systems.

39. Compared with the 2013 annual submission, the recalculations increased emissions in the industrial processes sector in 2011 by 0.38 Gg CO_2 eq (0.1 per cent), and increased total national emissions by 0.002 per cent. The recalculations were adequately explained in the NIR.

40. The ERT noted that the Estonian inventory for the industrial processes sector is complete and that the AD, EFs, estimation methods and other background parameters used are generally transparently described in the NIR, except for the reporting of potential emissions of halocarbons and SF_6 (see para. 43 below).

41. The ERT noted that the estimates for the industrial processes inventory are largely based on country-specific data obtained from specific installations or organizations, including estimates of CO_2 emissions using plant-specific data on cement production, lime production and ammonia production. The ERT also noted that the Estonian inventory agency conducts many QC activities on the inventory emission estimates based on industry operator data and other national data sets, such as emission data from the EU ETS, as well as QC activities to compare aggregated installation-level AD against published national statistics. The ERT commends Estonia for the efforts made to engage directly with industry operators and experts in order to access country-specific data, for implementing detailed methods and QC activities, which improve the accuracy of the national inventory estimates, as well as for providing supporting evidence to enhance the completeness of the inventory.

42. Although the inventory agency conducts many QC activities, the ERT noted that the NIR includes only brief statements for each source category regarding the implementation of IPCC tier 1 QA/QC requirements and (where applicable) a summary of any data verification steps, such as the comparison of the inventory emission estimates against the EU ETS data, and/or the comparison of the inventory AD against other national statistics. In response to questions raised by the ERT during the review, Estonia provided many further details and clarifications regarding its QA/QC activities, including information on checks that are not mentioned in the NIR, such as those for the AD on lime production (see para. 48 below). Therefore, to improve the transparency of the NIR, the ERT encourages Estonia (where possible and without releasing commercially sensitive data) to include the details provided during the review in future submissions, including:

(a) Quantitative comparisons (e.g. tables with emission totals, differences, percentage differences) between the national inventory estimates and data from installations in the EU ETS for categories such as cement production, lime production and ammonia production;

(b) Details of the data sources, data flows between organizations (e.g. companies, regulators, the inventory agency) and cross-checks conducted against the data reported to other systems, such as: routine checks documented within the source-specific QA/QC checklists (mentioned in section 1.6.1.1 of the NIR); checks of AD against national statistics; and source category completeness checks (e.g. to ensure that the inventory estimates include data for all relevant installations that also report to the Estonian Air Pollution Sources Information System).

43. As in previous annual submissions, Estonia has reported potential emissions of HFCs, PFCs and SF_6 as "NO" or "NE" (not estimated). In response to a question raised by the ERT during the review, Estonia stated that as actual emissions of halocarbons and SF_6 are reported, the Party does not find it "rational" to also estimate potential emissions. The ERT notes that the reporting of potential emissions of halocarbons and SF_6 ensures the transparency and comparability of national inventories as required by the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), and also provides a quality check against

reported actual emissions of halocarbons and SF_6. The ERT recommends that Estonia report all emissions of halocarbons and SF_6 in accordance with the UNFCCC reporting guidelines in future submissions.

2. Key categories

Cement production – CO_2

44. Estonia reports CO_2 emissions from cement production across the time series using a consistent method utilizing plant-specific data from the one cement plant in Estonia, and applying a tier 2 method that is consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance), taking account of installation-specific cement kiln dust (CKD) correction factors. The method is transparently described in the NIR, with tables of the AD, EFs and CKD correction factors being presented. In response to a request made by the ERT during the review regarding the provision of the raw data used in the calculations rather than the overall AD and EFs, Estonia provided further details in order to present the underlying data used in the calculations, including: annual clinker production and CKD production, the calcium oxide and magnesium oxide contents of clinker, the CKD calcination rate, and the CO_2 emissions from clinker production and from CKD production. The ERT commends Estonia for providing full details of the calculation methodology, and notes that these data are regarded as commercially sensitive (and confidential) by the one cement plant operator in the country and therefore cannot be presented in the NIR but are available to ERTs.

45. For the uncertainty estimates for the cement production category, Estonia uses default values from the IPCC good practice guidance. In response to questions raised by the ERT during the review, Estonia clarified that the plant operator was previously approached with a request for information on the uncertainty estimates for the AD and EFs, but that the information provided by the plant operator was insufficient to verify the AD and EF uncertainty values used in the national inventory. The ERT notes that all of the parameters used to generate the national inventory estimates are country-specific and, therefore, the uncertainty parameters should reflect this, considering that use of the IPCC defaults will generate an inaccurate result. Therefore, the ERT recommends that Estonia review this issue and derive country-specific uncertainty parameters for this source category in future submissions.

Ammonia production – CO_2

46. Estonia estimates CO_2 emissions from ammonia production using plant-specific data on natural gas consumption and on the composition of natural gas from the one ammonia manufacturing facility, Nitrofert AS, applying a method that is consistent with the Revised 1996 IPCC Guidelines. The ERT noted that the transparency of the reporting of this category in the NIR was adequate but, during the review, Estonia provided more detail on the background of the data sources that inform the estimates of ammonia production as well as the estimates of natural gas used as fuel in the ammonia plant calculated for the subcategory chemicals under manufacturing industries and construction, including the process of cross-checking the data submitted to SE and the data reported as non-energy use in the energy balance. The ERT encourages Estonia to include these additional details in the NIR of its next annual submission so as to further improve transparency, and to clarify the data management for natural gas use at the plant and the source-specific quality checks against the national statistics and the data reported under the EU ETS.

47. Estonia included in NIR table A3.2.1 (in annex 3) information on natural gas use and data on its composition, thereby providing a transparent insight into the key underlying

data used to derive the national inventory estimates. In response to questions raised by the ERT during the review, Estonia provided further details to clarify the reference conditions for the analysis of natural gas composition, and to outline the sampling frequency that underpins the annual natural gas EF applied. The ERT encourages Estonia to include these details in the NIR of its future annual submissions, and to present the gas EF on an energy basis in order to further improve comparability against the EFs for other categories and other reporting Parties.

3. Non-key categories

Lime production – CO_2

48. The ERT noted that the NIR includes a summary of the data sources used and QC procedures conducted for the lime production category. In response to questions raised by the ERT during the review, the ERT noted that the inventory AD, compiled from annual surveys of all lime plant operators, were lower than the national lime production data published by SE for several years of the time series. Estonia's inventory compiler followed up with SE and clarified that there is an error in the current national statistics data set and that this error will be corrected in the future. The ERT considered the available information from the main lime production plant in Estonia and reviewed the time-series consistency; the national inventory trends for the sector are closely comparable with those reported by the lime producers under the EU ETS, and the inventory agency stated that SE has identified a reporting error in the data for 2008 and 2009. The ERT therefore agrees with the inventory agency that the AD discrepancy between the inventory and the SE data sets does not indicate an under-reporting of emissions in the national inventory. The ERT commends Estonia for implementing quality checks on the AD and for the completeness of its reporting, and, as noted in paragraph 42(b) above, encourages Estonia to include further details of these QA/QC procedures in future submissions, to further improve transparency.

Other (mineral products) – CO_2

49. In the previous review report, the ERT encouraged Estonia to develop a country-specific method for the category glass production, as there is only one glass plant in Estonia. The ERT noted that Estonia has not implemented this change to the methods applied for this category. In response to questions raised by the ERT during the review, Estonia outlined that new data covering plant-specific emissions for the period 2007–2013 had been made available to the inventory agency and that a methodological improvement to incorporate these new data is planned for the 2015 annual submission. The ERT commends Estonia's commitment to using plant-specific data to derive a more accurate EF for glass production, despite this not being a key source category. The ERT encourages Estonia to implement this change in its 2015 annual submission, while noting the importance of maintaining time-series consistency for this source category.

D. Agriculture

1. Sector overview

50. In 2012, emissions from the agriculture sector amounted to 1,326.17 Gg CO_2 eq, or 6.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 58.3 per cent. The key drivers for the fall in emissions are the decrease in the livestock population and the decrease in the amount of synthetic fertilizer and manure applied to soils. Within the sector, 56.4 per cent of the emissions were from agricultural soils, followed by 31.9 per cent from enteric fermentation. The remaining 11.6 per cent were from manure management.

51. The ERT commends Estonia for its continuing efforts to improve the quality of its reporting, the accuracy of its calculations and the transparency of the information presented in its NIR. The ERT considers that the NIR of its 2014 annual submission contains sufficient detail and provides most of the essential data and explanations.

52. Estonia has made recalculations for the agriculture sector between the 2013 and 2014 submissions in response to the recommendations from previous annual review reports in 2012 and 2013. For the 2014 annual submission, several recalculations were carried out to improve the quality of the inventory in the following categories of the agriculture sector: enteric fermentation, manure management, direct soil emissions, and pasture, range and paddock emissions.

53. Estonia used tier 2 methods to calculate emissions from most of the categories related to livestock, especially CH_4 emissions from enteric fermentation and manure management. The uncertainty estimates have been calculated based on the tier 1 approach presented in the IPCC good practice guidance using default uncertainty values for most parameters. The ERT noted in the 2014 annual submission that the main reason for using default uncertainty values is the lack of uncertainty values for AD, although Estonia has detailed statistics on livestock, thereby enabling the use of the tier 2 approach for the estimation of emissions. The ERT encourages Estonia to investigate the possibility of using country-specific data on livestock for the uncertainty estimates, especially for CH_4 emissions from enteric fermentation, and CH_4 and N_2O emissions from manure management.

2. Key categories

Enteric fermentation – CH_4

54. Estonia has used a tier 2 method and country-specific parameters for the estimation of emissions from cattle and swine, and a tier 1 method and IPCC default parameters for the estimation of emissions from all other animals, including sheep, goats, horses and fur-bearing animals, which are not significant animal types under this key category. The implemented calculations are in line with the IPCC good practice guidance and complete for this category. The ERT noted that Estonia has continued to improve the transparency of its reporting regarding the characteristics of non-dairy cattle, including animal weights and CH_4 conversion factors. In addition, Estonia has continued to report bovine cattle (aged one to two years) under the young cattle subcategory, as recommended in previous review reports. The ERT commends Estonia for its continued efforts to improve its reporting and to increase the transparency of its 2014 annual submission.

55. For fur-bearing animals, Estonia has used an EF of 0.1 kg/animal/year from Norway, based on the advice of a Finnish expert, as no IPCC default value is available. This value is used by different Nordic countries but can depend on the type of animal (e.g. mink, fox). In the previous review report, the ERT reiterated a past encouragement that Estonia develop country-specific EFs for fur-bearing animals. However, Estonia responded that it was not possible to do this because of the low level of emissions involved and the lack of resources. The ERT reiterates the previous encouragement that Estonia present, in the NIR of its next annual submission, a comparative analysis of the types of animals used to develop the EF from Norway and the fur-bearing animals bred in Estonia or explore the use of EFs from other reporting Parties with similar characteristics.

56. Estonia reported CH_4 emissions from enteric fermentation for poultry as "NE". Although the ERT notes that there is no specific methodology in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, it encourages Estonia to explore possibilities of using methods developed by other reporting Parties to estimate these emissions, considering the fact that enteric fermentation is a key category.

Manure management – CH_4 and N_2O

57. Estonia used a tier 2 method and country-specific EFs for cattle and swine, but used a tier 1 method and default EFs for other livestock that are not significant animal types in these key categories. This is in line with the IPCC good practice guidance and the estimates for these categories are complete. Estonia has developed and reported since the 2012 annual submission its domestic manure management system, which disaggregates manure management practices more accurately using country-specific data collected by SE. The ERT commends Estonia for moving from the tier 1 to the tier 2 approach.

58. As recommended in the previous review report, Estonia correctly reported the allocation structure of manure management systems for swine in CRF table 4.B(a) of the 2014 annual submission. The ERT commends Estonia for implementing this correction.

59. The ERT noted that Estonia revised the reporting of N excretion values for dairy cattle and fur-bearing animals in CRF table 4.B(b) in the 2014 annual submission as recommended in the previous review report. The ERT commends Estonia for correcting its reporting. The ERT also noted that Estonia provided information in the NIR on the N excretion rate of dairy cattle at the county level, explaining the trend of N excretion for this type of livestock, as recommended in the previous review report. The ERT commends Estonia for increasing the transparency of its reporting.

Agricultural soils – N_2O

60. The ERT noted that Estonia correctly reported the AD for pasture in CRF table 4.D in its 2014 annual submission and conducted the corresponding recalculations, as recommended in the previous review report. The ERT commends Estonia for implementing the recommendation and improving the accuracy of its reporting.

61. In the 2014 annual submission, Estonia used zero as the value for the parameter $Frac_R$ following the recommendation of the ERT made in the 2012 in-country review. To improve the quality of the emission estimates for this category and to be in line with the IPCC good practice guidance, Estonia plans to develop a more accurate value for the parameter $Frac_R$. The ERT reiterates the recommendation made in the previous review report that Estonia revise its estimate of $Frac_R$ on the basis of national statistics and studies.

E. Land use, land-use change and forestry

1. Sector overview

62. In 2012, net removals from the LULUCF sector amounted to 1,951.18 Gg CO_2 eq. Since 1990, net removals have decreased by 77.9 per cent. The key drivers for the fall in removals are the increasing harvest rates and expanding settlement areas. Within the sector, 3,073.09 Gg CO_2 eq of net removals were from forest land, followed by 431.77 Gg CO_2 eq of net emissions from grassland. Net emissions of 263.81 Gg CO_2 eq were reported from settlements, 195.11 Gg CO_2 eq from cropland and 188.20 Gg CO_2 eq from wetlands. The remaining 43.02 Gg CO_2 eq of net emissions were from other land.

63. Estonia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Estonia between the 2013 and 2014 annual submissions were in the following categories: forest land, cropland and grassland. The recalculations were made in response to the 2013 annual review report following changes in AD and EFs. Compared with the 2013 annual submission, the recalculations increased removals in the LULUCF sector by 1,379.46 Gg CO_2 eq (32.4 per cent) in 2011. The recalculations were adequately explained.

64. The ERT noted that the LULUCF sector has been subject to improvements since the previous annual submission. Estonia has followed up on the recommendations made in previous review reports, in particular addressing issues of completeness, consistency and transparency. Estonia has greatly improved completeness by reducing the number of missing estimates, specifically in the categories land converted to wetlands and settlements. Estonia has ensured greater consistency in its use of notation keys. Where no guidance is provided, the notation key "NE" is used rather than "NO". In the 2014 annual submission, Estonia has improved transparency by providing more detailed information on the methodology used to estimate the carbon stock changes in the category any land converted to other land in the NIR. Estonia has provided more information in its 2014 annual submission on its capacity to detect the exact year of an occurrence of land-use change and its subsequent consistent representation in the time series to improve consistency and transparency. The ERT commends Estonia for implementing these improvements.

65. The ERT noted that Estonia has changed its reporting for the precursor gases and sulphur dioxide (SO_2) from "NE" to "NA" (not applicable). The ERT encourages Estonia to review its use of the notation key "NA" and report the notation key "NE" for these gases, in line with annex I to decision 24/CP.19, in its next annual submission.

66. The reporting of the LULUCF sector is complete in so far as mandatory GHGs, land-use categories and carbon pools are considered for all years of the time series and for all of Estonia's land area. The ERT commends Estonia for implementing improvements that have completed the reporting in the LULUCF sector. Estonia does not estimate emissions for the following non-mandatory land-use categories and carbon pools: non-CO_2 emissions from drainage of forest soils; net carbon stock changes in soils in grassland converted to wetlands; all pools and all gases in settlements remaining settlements; non-CO_2 emissions in land converted to settlements; and N_2O emissions in harvested wood products and other. The ERT encourages Estonia to estimate and report emissions from all non-mandatory categories.

67. The ERT commends Estonia for implementing the recommendations from the previous review report with regard to:

(a) Providing more detailed information on the methods used to estimate the carbon stock changes in the category any land converted to other land;

(b) Providing information on how the exact year of occurrence of land-use change is detected and how it is consistently represented in the time series.

2. Key categories

Forest land remaining forest land – CO_2

68. Estonia has implemented reiterated recommendations from previous review reports to explore ways to reduce inter-annual variability in the carbon stock changes in living biomass by applying data set smoothing. Estonia reported that the high variability in the forest land living biomass estimates results from the use of the national forest inventory (NFI) data to calculate the living biomass from the growing stock, which includes sampling errors. In response to recommendations from previous reviews, Estonia has introduced data set smoothing (curve fitting) to create an approximating function that attempts to capture important patterns while eliminating the "noise". An algorithm of fifth degree polynomial was applied to the actual NFI data. In response to a question raised by the ERT during the review, Estonia explained that it has improved the sampling frequency of its latest cycle of the NFI by increasing the number of clusters of sample plots it inventories each year by one third, beginning in 2014. The full cycle of five years will be completed by the end of the second commitment period of the Kyoto Protocol. The increased sampling could reduce

inter-annual variability in the future estimates and potentially reduce the need for data set smoothing. The ERT commends Estonia for increasing the frequency of its NFI and recommends that Estonia include the information provided to the ERT during the review on the increased frequency of the sampling programme being undertaken in its NFI, in the next annual submission.

Land converted to forest land – CO_2

69. The removals from land converted to forest land were reported incorrectly in the 2014 annual submission. The estimates were –38.48 Gg CO_2 compared with –130.51 Gg CO_2 under afforestation/reforestation. Following a question raised by the ERT during the review, Estonia recognized that a mistake had been made in the calculations for the living biomass estimates for land converted to forest land, resulting in an underestimation of removals for this land-use category. The ERT recommends that Estonia correct this calculation in its next annual submission and improve its QC activities.

F. Waste

1. Sector overview

70. In 2012, emissions from the waste sector amounted to 308.17 Gg CO_2 eq, or 1.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 13.2 per cent. The key driver for the fall in emissions is the collapse of the Soviet Union and the transition of Estonia from a centrally planned economy to a market economy after 1991, which has led to a closure of industries, especially the pulp and paper industry, and thus has especially affected emissions from wastewater handling (which decreased by 76.3 per cent in the period 1990–2012). Within the sector, 78.0 per cent of the emissions were from solid waste disposal on land, followed by 13.2 per cent from wastewater handling. Other (biogas burning and biological treatment) accounted for 8.5 per cent. The remaining 0.3 per cent were from waste incineration.

71. Estonia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Estonia between the 2013 and 2014 annual submissions was in the category other (biogas burning and biological treatment). This recalculation was made following revisions of AD for the entire time series. Compared with the 2013 annual submission, the recalculation resulted in a decrease in emissions in 2011 in the waste sector by 66.46 Gg CO_2 eq (17.0 per cent) and a decrease in total national emissions by 0.35 per cent. The recalculation was adequately explained in the NIR and was further elaborated on in response to a question raised by the ERT regarding the reason for the recalculations and possible implications on the emissions in the waste sector (see para. 76 below).

72. The inventory is generally transparent and complete in terms of categories, gases, years and geographical coverage. Transparency could, however, be improved by including all relevant information for the calculations in the most recent annual submission. This means including, for example, current information on wastewater treatment systems instead of referring to the 2006 NIR (see para. 79 below) or clearly stating the waste amounts considered in the calculations (e.g. separately adding collected waste to table 8.6 of the NIR or marking inert industrial waste as not having been considered in the calculations).

2. Key categories

Solid waste disposal on land – CH_4

73. Estonia has applied the first-order decay method to estimate emissions from solid waste disposal on land. The AD, EFs and parameters used in the calculations are well

described in the NIR. Estonia uses the default CH_4 generation rate constant (k) and default degradable organic carbon (DOC) values from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). This allows for the incorporation of more waste types (e.g. sludge, industrial waste) in the calculations. Other parameters used, such as the methane correction factor (MCF), the fraction of DOC dissimilated, the oxidation factor and the fraction of CH_4 in landfill gas are the default values from the IPCC good practice guidance. The ERT commends Estonia for considering emissions from non-municipal solid waste in the calculations, but also recommends that the Party make efforts to use national parameters (especially country-specific DOC and k values for municipal and industrial waste) instead of IPCC default values in order to improve the accuracy of the estimates.

74. For the years 1990–1994, all disposal sites in Estonia are characterized as "uncategorized disposal sites" because of the lack of data on the type and character of (unmanaged) landfill sites (shallow or unmanaged). In response to a recommendation made in the previous review report, the above-mentioned justification has been included in the NIR to improve transparency.

75. The ERT noted an inconsistency in the reporting of the annual amount of disposed waste between CRF table 6.A and the NIR (tables 8.5 and 8.6) for all years of the time series. As explained during the review, the discrepancy has arisen because the AD have been revised for the calculations (e.g. considering information on some collected waste), while the data in the NIR have remained unchanged. The ERT recommends that Estonia enhance its QC activities to avoid such inconsistencies in the future and that the Party provide accurate information on the AD used in the NIR of its next annual submission.

Other (waste) – CH_4 and N_2O

76. Estonia estimates and reports emissions from composting by applying the tier 1 approach and using default EFs from the 2006 IPCC Guidelines. Recalculations of emissions have been reported for the entire time series in the 2014 annual submission. These are described in the NIR and were also elaborated on during the review. The recalculations were considered necessary after detailed inspection by EtEA of waste amounts and types reported as activity type R3[4] under the European Union (EU) waste framework directive. Quantities improperly reported under this directive as R3 activity (e.g. animal manure) have been excluded retrospectively. The ERT recommends that Estonia include more details on the origin of the data for other waste and the related QA/QC activities in its next annual submission.

77. The ERT noted a decline of 32.1 per cent in the amount of biologically treated waste in the period 2010–2012. In response to a question raised by the ERT during the review, Estonia explained that the decline in biologically treated waste since 2010 resulted from the opening of a new incineration facility in the country. In addition, the increase of landfilled sludge also decreased the amount of composted waste. The ERT encourages Estonia to include this information in the NIR of its next annual submission.

3. Non-key categories

Wastewater handling – CH_4

78. Estonia calculates CH_4 emissions from domestic wastewater using the method from the Revised 1996 IPCC Guidelines by multiplying the total organic waste by an EF that is a

[4] Categorization under the European Union waste framework directive, defining recovery operations (directive 2008/98/EC, annex II). Code "R3" covers recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).

function of the maximum methane-producing potential (Bo) and an MCF. For wastewater treated in the wastewater treatment plants with anaerobic treatment cycles, Estonia used an MCF of 0.6 (within the IPCC default range) in the calculations, based on expert judgement from the EtEA Water Bureau. The ERT commends Estonia for providing information on the expert judgement in its NIR.

79. During the review, Estonia explained that only 1 per cent of the wastewater is treated under partly anaerobic conditions (applying an MCF of 0.6), whereas 99 per cent of the wastewater in Estonia is treated solely aerobically (applying an MCF of zero and thus reporting no CH_4 emissions). The ERT recommends that the Party include information on the wastewater handling systems in Estonia (fraction of treated wastewater in anaerobic and aerobic conditions) in its next annual submission.

80. The value of 0.25 kg CH_4/kg biological oxygen demand (BOD) for Bo (taken from the Revised IPCC 1996 Guidelines) was used by Estonia in its initial 2014 annual submission (15 April 2014), although according to the IPCC good practice guidance it is good practice to use a default value of 0.6 kg CH_4/kg BOD for domestic wastewater. According to the Party, the lower Bo value was used as it is more suitable to Estonia's circumstances. In response to questions raised by the ERT during the review, Estonia explained that the aerobic conditions at wastewater treatment plants justified the use of a lower Bo value. The explanation was not accepted by the ERT considering that Bo is affected by the composition of the wastewater and not by the aerobic/anaerobic conditions in the wastewater treatment.

81. In response to the list of potential problems and further questions raised by the ERT, Estonia submitted revised estimates of CH_4 emissions from domestic and commercial wastewater handling, calculated using the value of 0.6 kg CH_4/kg BOD for Bo taken from the IPCC good practice guidance. Following the submission of the revised estimates for the wastewater category (submitted on 10 October 2014), the ERT considered the problem identified during the review to be resolved. The recalculation resulted in an increase in emissions in 2012 by 1.04 Gg CO_2 eq, or 0.3 per cent, and an increase in total national emissions by 0.01 per cent.

Waste incineration – CO_2 and N_2O

82. Estonia reports CO_2 and N_2O emissions from waste incineration without energy recovery as "NO" for the years 2008 and 2011. In response to a question raised by the ERT during the review, Estonia explained that no incinerated waste amounts were reported by the operators in 2008 and 2011 and that this activity was considered as not occurring. The ERT considered this issue during the 2014 annual review and did not identify a potential problem during the review week. However, the ERT strongly recommends that Estonia carefully consider the issue raised in this paragraph in the context of its 2015 annual submission.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

83. Table 6 provides an overview of the information reported and parameters selected by Estonia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	No information on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested was provided in the 2014 annual submission. In response to a question raised by the ERT, this information was provided. The ERT recommends that Estonia provide this information, taking into account future requirements provided in decision 6/CMP.9, in its next annual submission
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	None	
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	Estonia's ability to identify areas of land and areas of land-use change was not adequately explained in its 2014 annual submission. In response to questions raised by the ERT during the review, sufficient information was provided on the national forest inventory (the sampling for which has been intensified), the use of land cadastre data and local authority records, and the determination of the 1990 land-use baseline, thereby demonstrating Estonia's ability to identify areas of land and areas of land-use change subject to activities under Article 3, paragraph 3, of the Kyoto Protocol. The ERT recommends that Estonia provide this information, taking into account future requirements provided in decision 6/CMP.9, in its next annual submission

Abbreviation: ERT = expert review team.

84. Chapter G.I includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 85–87 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

85. Emissions and removals from activities reported under Article 3, paragraph 3, of the Kyoto Protocol, are estimated from AD, growing stock levels and forest species data collected from NFI, default biomass conversion and expansion factors, country-specific

data, and estimates from the Swedish 2013 annual submission for litter, mineral and organic soils. Estonia reports land-use change using method 1 and approach 3 from the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Additional field studies, older maps and aerial photos are also used, as well as data collected from permanent sample plots since 1999. The ERT concluded that the methods are in line with decision 16/CMP.1 and encourages Estonia to include this information in its next annual submission.

Afforestation and reforestation, and deforestation – CO_2

86. Estonia reports very low levels of land-use change occurring since 1990. The uncertainties for the AD reported show greater levels of uncertainty than the area of change reported in the NIR. For example, the combined uncertainties for afforestation and reforestation activities are 104 per cent (excluding biomass burning) (i.e. 322 ha ± 336 ha in 2012). These low levels of land-use change are supported by the CORINE Land Cover change statistics for Estonia. The ERT notes that the methods used to detect land-use change are in line with decision 16/CMP.1 and acknowledges that the frequency of the sampling for the current NFI has been increased. For the current measurement cycle, the number of sampling clusters is being increased by 40 per cent. NFI runs on a five-year cycle. The increased sampling began in 2014, and will therefore be completed in 2019. The ERT commends Estonia for increasing the sampling frequency of its NFI and recommends that when revising its estimates of land-use change and its associated uncertainties, following the completion of the current NFI, Estonia demonstrate that the methods used are capable of detecting land-use change within acceptable confidence limits.

87. The ERT commends Estonia for implementing recommendations from the previous review report with regard to:

(a) Reporting the net carbon stock changes in the dead wood pool under afforestation/reforestation;

(b) Providing information that justifies the reporting that no units of land have been harvested under afforestation/reforestation activities since the beginning of the commitment period;

(c) Applying the same forest definition throughout the reporting under the Convention and its Kyoto Protocol.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

88. Estonia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[5] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

89. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent

[5] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. Estonia provided a reference to this publicly available information in the NIR (chapter 12.4, page 426), but the ERT was not able to find the respective information. The ERT recommends that Estonia verify the reference provided in the NIR and present this information or provide claims of confidentiality. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

90. Estonia has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

91. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–494 851		–494 851
Harvested land	NA, NO		0
Deforestation	2 890 573		2 890 573
Forest management	NA		NA
Article 3.3 offset[c]	NA		NA
Forest management cap[d]	NA		NA
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas

emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

92. Based on the information provided in table 7 for the activity afforestation and reforestation, Estonia shall: for non-harvested land, issue 494,851 removal units (RMUs) in its national registry; and for harvested land, neither issue nor cancel any units in its national registry.

93. Based on the information provided in table 7 for the activity deforestation, Estonia shall cancel 2,890,573 assigned amount units, emission reduction units, certified emissions reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

94. Estonia has reported its commitment period reserve in its 2014 annual submission. Estonia reported its commitment period reserve to be 95,942,143 t CO_2 eq based on the national emissions in its most recently reviewed inventory (19,188,429 t CO_2 eq). The ERT notes that based on the submission of revised emission estimates by Estonia during the review of the 2014 annual submission, the commitment period reserve changed, and the new commitment period reserve is reported as 95,947,352 t CO_2 eq based on the revised national emissions in its most recently reviewed inventory (19,189,470 t CO_2 eq). The ERT agrees with this figure.

3. Changes to the national system

95. Estonia reported that there are changes in its national system since the previous annual submission. The Party described the change in its NIR regarding the merger of the Estonian Meteorological and Hydrological Institute and EEIC in the new EtEA, which is the legal successor to its predecessors. In collaboration with MoE, EERC and EtEA are currently involved in the preparation of the inventory, with EERC as the inventory compiler, responsible for the coordination of the inventory process, the calculation of emission estimates, the compilation of the NIR, the implementation of the QA/QC plan and the overall archiving system. The ERT concluded that Estonia's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

96. Estonia reported that there are changes in its national registry since the previous annual submission. Estonia provided detailed information in its NIR about the changes introduced into the database structure by the new releases of the national registry, affecting only the registry's EU ETS functionality. The ERT noted that Estonia provided a reference to the publicly available information in accordance with the requirements referred to in decision 13/CMP.1, annex, paragraphs 44–48, in the NIR (chapter 12.4, page 426), but the ERT was not able to find the respective information in the web link of the user interface provided, because the web page of the national registry was not functional. The ERT recommends that Estonia verify the reference provided in the NIR and present the referenced publicly available information in accordance with the requirements referred to in decision 13/CMP.1, annex, paragraphs 44–48, including any claims of confidentiality, in its next annual submission. The ERT concluded that, taking into account the confirmed changes in the national registry, Estonia's national registry continues to perform the

functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

97. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Estonia provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

98. Estonia reported, in relation to the EU decision on the inclusion of aviation in the EU ETS in 2012, that it is the administrative member State for one aircraft operator from a developing country – Zambezi Airlines of Zimbabwe. Aircraft operators from developing countries will be affected to the extent that they operate on routes covered by the EU ETS. Zambezi Airlines of Zimbabwe did not have any EU-related flights in 2013. Estonia also reported that it supports regional and international development measures related to renewable energy and encourages the exchange of best practices in the production of energy from renewable sources between regional and international development initiatives. Furthermore, under fast-start finance, Estonia is co-financing an action in Bhutan named "Global Climate Change Alliance – Climate Change Adaptation in the Renewable Natural Resources Sector", in cooperation with the European Commission, and is financing a project to strengthen climate change adaptation in rural communities, for agriculture and environmental management in Afghanistan within the United Nations Environment Programme project entitled "Environmental Cooperation for Peacebuilding – Phase III" with the objective of building national capacity to plan for community resilience to climate change based threats.

99. Estonia did not provide information on the changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its annual submission. However, Estonia updated the information regarding the inclusion of aviation in the EU ETS, with respect to the EU decision to "stop the clock" on the deadline for inclusion,[6] in the context of an expected International Civil Aviation Organization resolution on the matter, and the cooperation projects with developing countries. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent. The ERT recommends that Estonia, in its next annual submission, report any change(s) in its information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP.

[6] Decision 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community Text with European Environment Agency relevance; regulation (EU) 421/2014 of the European Parliament and of the Council of 16 April 2014 amending directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions.

III. Conclusions and recommendations

A. Conclusions

100. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Estonia, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Estonia

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The ERT concludes that the inventory submission of Estonia is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Estonia has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	No	See para. 99 above

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team,

IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

101. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Energy	Comparison of the reference and sectoral approaches	Provide clear and comprehensive explanations in the next NIR with additional information on the drivers behind the difference in the CO_2 emissions in the sectoral and reference approaches between two annual submissions (especially if a significant difference persists in future annual submissions)	No	23
		Improve the consistency between the data reported to IEA and the data gathered by SE	Yes	24
	Stationary combustion: solid fuels – CO_2	Collect data (plant-specific parameters or direct measurements) on the carbon content of the last fuel stream (semi-coke from gaseous heat carriers in gas generator technology and flue gases from solid heat carrier technology) and prepare a complete and accurate carbon balance, including a verification that no fugitive losses occur during the process that might not be captured by the current approach and ensuring that no emission estimates are missing	Yes	28
		Apply strict QC procedures to the EFs used from the EU ETS, ensuring the quality of the data, and provide sufficient information on these EFs in the NIR	No	30
	Road transportation: liquid fuels – CO_2	Provide a table listing all EFs used to calculate the weighted average EF for Estonia, at least for the most recent reporting year and for all three fuels	No	31
	Oil and natural gas: oil – CH_4	Change the notation key for distribution of oil products, as this practice does occur in Estonia	Yes	34

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation*[a]	*Paragraph cross-references*
Industrial processes and solvent and other product use	Sector overview	Report all emissions of halocarbons and SF_6 in accordance with the UNFCCC reporting guidelines	No	43
	Cement production – CO_2	Review the uncertainty estimates and derive country-specific uncertainty parameters for this source category	No	45
Agriculture	Agricultural soils – N_2O	Revise the estimate of $Frac_R$ on the basis of national statistics and studies	Yes	61
LULUCF	Forest land remaining forest land – CO_2	Include the information provided to the ERT during the review on the increased frequency of the sampling programme being undertaken in NFI	No	68
	Land converted to forest land – CO_2	Correct the calculation of removals from land converted to forest land and improve the QC activities	No	69
Waste	Solid waste disposal on land – CH_4	Make efforts to use national parameters (especially country-specific DOC and k values for municipal and industrial waste) instead of IPCC default values in order to improve the accuracy of the estimates	No	73
		Enhance the QC activities to avoid inconsistencies regarding the annual amount of disposed waste in the future and provide accurate information on the AD used in the NIR	No	75
	Other (waste) – CH_4 and N_2O	Include more details on the origin of the data for other waste and the related QA/QC activities	No	76
	Wastewater handling – CH_4	Include information on the wastewater handling system in Estonia (fraction of treated wastewater in anaerobic and aerobic conditions)	No	79
	Waste incineration – CO_2 and N_2O	Carefully consider the availability of information regarding waste incineration for the years 2008 and 2009 and the use of the notation key "NO" in the context of the 2015 annual submission	No	82
KP-LULUCF	Sector overview	Provide the information submitted to the ERT on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested, taking into account future requirements provided in decision 6/CMP.9	No	Table 6
		Provide the information submitted to the ERT on Estonia's ability to identify areas of land and areas of land-use change, taking into account future requirements provided in decision	No	Table 6

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
		6/CMP.9		
	Afforestation and reforestation, and deforestation – CO_2	When revising the estimates of land-use change and the associated uncertainties, following the completion of the current NFI, demonstrate that the methods used are capable of detecting land-use change within acceptable confidence limits	No	86
National registry		Verify the reference to the publicly available information provided in the NIR and present this information or provide claims of confidentiality	No	89
Article 3, paragraph 14, of the Kyoto Protocol		Report any change(s) in the information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP	No	99

Abbreviations: AD = activity data, Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, $Frac_R$ = fraction of total above-ground crop biomass that is removed from the field as crop, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, k = CH_4 generation rate constant, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NO = not occurring, NIR = national inventory report, NFI = national forest inventory, QA/QC = quality assurance/quality control, SE = Statistics Estonia, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

IV. Questions of implementation

102. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	95 942 143	95 947 352		95 947 352
Annex A emissions for 2012				
CO_2	17 079 279			17 079 279
CH_4	930 616	931 658		931 658
N_2O	1 009 209			1 009 209
HFCs	167 360			167 360
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 965			1 965
Total Annex A sources[c]	**19 188 429**	**19 189 470**		**19 189 470**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–130 510			–130 510
3.3 Afforestation and reforestation on harvested land for 2012	NA, NO			NA, NO
3.3 Deforestation for 2012	437 097			437 097
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	18 427 186			18 427 186
CH_4	923 352	924 431		924 431
N_2O	971 849			971 849
HFCs	159 723			159 723
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 854			1 854
Total Annex A sources[c]	**20 483 964**	**20 485 043**		**20 485 043**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–119 688			–119 688
3.3 Afforestation and reforestation on harvested land for 2011	NA, NO			NA, NO
3.3 Deforestation for 2011	466 493			466 493
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	17 803 320			17 803 320
CH_4	966 707	967 785		967 785
N_2O	967 467			967 467
HFCs	153 038			153 038
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 811			1 811
Total Annex A sources[c]	**19 892 343**	**19 893 422**		**19 893 422**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–102 871			–102 871
3.3 Afforestation and reforestation on harvested land for 2010	NA, NO			NA, NO
3.3 Deforestation for 2010	527 789			527 789
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	14 157 980			14 157 980
CH_4	946 175	947 254		947 254
N_2O	944 595			944 595
HFCs	138 310			138 310
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 440			1 440
Total Annex A sources[c]	**16 188 501**	**16 189 580**		**16 189 580**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–81 292			–81 292
3.3 Afforestation and reforestation on harvested land for 2009	NA, NO			NA, NO
3.3 Deforestation for 2009	706 581			706 581
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	17 365 553			17 365 553
CH_4	1 012 154	1 013 233		1 013 233
N_2O	1 035 350			1 035 350
HFCs	131 477			131 477
PFCs	38			38
SF_6	1 350			1 350
Total Annex A sources[c]	**19 545 923**	**19 547 002**		**19 547 002**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–60 490			–60 490
3.3 Afforestation and reforestation on harvested land for 2008	NA, NO			NA, NO
3.3 Deforestation for 2008	752 613			752 613
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf# page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Estonia 2014. Available at <http://unfccc.int/resource/docs/2014/asr/est.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/EST. Report of the individual review of the annual submission of Estonia submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/est.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Ingrid Võrno (Keskkonnaministeerium/Ministry of the Environment), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Estonia:

Veiko Adermann. 2010. *National Forest Inventories, Pathways for Common Reporting. Chapter 10 Estonia.*

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
Bo	maximum methane-producing potential
BOD	biological oxygen demand
CH_4	methane
CKD	cement kiln dust
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
EEIC	Estonian Environment Information Centre
EERC	Estonian Environmental Research Centre
EF	emission factor
ERT	expert review team
EtEA	Estonian Environment Agency
EU	European Union
EU ETS	European Union Emissions Trading System
$Frac_R$	fraction of total above-ground crop biomass that is removed from the field as crop
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
k	CH_4 generation rate constant
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LPG	liquefied petroleum gas
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
MoE	Ministry of the Environment
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SE	Statistics Estonia

SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne
UNFCCC	United Nations Framework Convention on Climate Change